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RADIUM

EDITED BY
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AND
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VOL. XI SEPTEMBER, 1918 No. 6

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A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY PHYSICS AND THERAPEUTICS OF RADIUM AND RADIO-ACTIVE SUBSTANCES

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RADIUM

A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY, PHYSICS AND THERAPEUTICS OF RADIUM AND RADIO-ACTIVE SUBSTANCES

Edited and Published by Charles H. Viol, Ph. D., and William H. Cameron, M. D. with the assistance of collaborators working in the fields of Radiochemistry, Radioactivity and Radiumtherapy.

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VOL. XI SEPTEMBER, 1918 No. 6

RADIUM IN THE TREATMENT OF CARCINOMA OF THE BUCCAL CAVITY*

By Robert B. Greenough, M.D., Boston

(From the Cancer Commission of Harvard University)

The employment of radium in the treatment of cancer followed shortly after the discovery and description of the element by the Curies. The x-rays had already been used with more or less success in the treatment of disease of various kinds, including malignant disease, and the world was quick to appreciate the advantages of a source of radioactivity so compact and so continuous in its action as the radium salts. For weak superficial application the radium salts themselves are used, spread thin on a piece of metal and fixed with varnish. Applicators of this character, valued at from $500 to $2500, are in use in many clinics for treatment of superficial skin lesions, but are of little value in cases of carcinoma of the deeper tissues. For more powerful dosage the gaseous emanation which is constantly given off from the radium salts is used in preference to the salt itself.

Radium element is constantly undergoing disintegration, or decay, at a rate such that in seventeen hundred years a given amount of radium will be reduced one-half in quantity. This disintegration is accompanied by a discharge of particles from the atoms of radium which change their character in such a way that several different disintegration products can be recognized. Thus the first change is from radium element to radium emanation—a gaseous product which again changes rapidly to radium A, radium A to radium B, etc. The penetrating rays which are given off come from the disintegration products radium B, and C,

*Reprinted from the Boston Med. and Surg. Jour. CLXXVIII, March 2, 1918, pp. 598-602.

*Read at a meeting of the Harriet Newell Lowell Society for Dental Research, November, 1917.

rather than from the radium itself or from its emanation, but as radium B and C are being constantly produced by the radium and are being deposited upon the tube or vessel containing the element, the radio-activity of a given quantity of radium remains almost, but not quite, a constant amount, the newly-formed deposited disintegration products nearly replacing the ones which are destroyed. The gaseous emanation, however, when removed from its source of supply, undergoes very rapid decay into radium A, B and C, and in four days is reduced about one-half in substance and in radioactivity. The life of radium A, B and C is even shorter, and the final result of this disintegration is an element similar to lead, and devoid of further radioactive function.

From the disintegration products, radium A, B and C, rays are given off of three different kinds: alpha, beta and gamma rays. The alpha and beta rays are readily absorbed by tissues, and thus have little penetration, but a good deal of caustic effect. It is the beta rays, especially, which are used in the weak radium applicators used for treatment of superficial cancer of the skin. The gamma rays of radium are even more penetrating than the x-rays, and it is these rays which are used for deeper and more powerful applications. The gamma rays are less abundant than the alpha and beta rays, but their effects can be obtained by the employment of large amounts of radium or of emanation which has been screened by lead or platinum to cut off the alpha and beta rays and permit only the gamma rays to reach the tissues.

At the Huntington Hospital radium is used in the form of emanation or gas. This gas is derived from the one thousand milligrams of radium which have been acquired by the Cancer Commission of Harvard University. Every day the emanation which has accumulated is drawn off and purified by a method devised by Professor Duane, and sealed in capillary glass tubes for use in the hospital. These tubes of emanation deteriorate and lose half of their strength every four days, but new ones are supplied every day, so that the amount available for treatment is practically constant. With these small capillary tubes an applicator can be prepared of any desired shape or size to produce the desired effect upon the tissues to be treated.

The effect of radium rays upon tissue is one of a peculiar nature, and not yet thoroughly understood. In general, however, it may be compared to a cauterizing agent. If the dose is strong, immediate effects are noticed, but if it is weaker, the effect may be much delayed. No pain is experienced at the time of the application, but the subsequent necrosis of tissue may be accompanied by marked hyperemia and swelling of the surrounding tissues, and a painful lesion result which is very slow to heal.

It is believed by many observers that a selective action is present in radium rays, such that tumor tissue is affected unfavorably in its growth by doses which do not produce material effects upon the normal surrounding tissues. This is certainly true in some particular forms of tumor tissue, if not in all, and has been attributed to the low vitality and consequent predisposition to necrosis which tumor cells have long been recognized to possess. Other observers attribute the beneficial effects of radiotherapy upon tumor tissue to the stimulation of the surrounding connective tissue, and the resulting fibrous tissue formation which diminishes the blood supply to the tumor and tends to encapsulate it and prevent its further extension. There is reason to believe that the body tissues of themselves exhibit some such reaction as this, as a response to the stimulus of the presence of the abnormal tumor tissue, and it is not im-

possible that this normal reaction may be increased by radium. Whatever the process by which it is accomplished as a result of exposure to radioactivity, tumor tissue undergoes changes which may extend to the complete, and, so far as we have been able to observe, the permanent disappearance of the tumor tissue. This is, of course, the object desired in the treatment of tumors by radium. It does not occur in every case. Some kinds of tumor are far more susceptible to radium treatment than others. In general, the milder and more superficial lesions are the ones which respond most readily, such as the senile keratoses, papillomata, and other of the so-called precancerous conditions. Superficial skin cancer also is frequently amenable to successful treatment with radium, while the deeper and more serious forms of cancer are more refractory. Some of the tumors of lymphatic origin are also notably responsive to radium treatment, although the results in such cases are less lasting, and recurrence of the growth is not uncommon.

Carcinoma in and about the mouth is one of the most common and distressing forms of malignant disease, and one in which operation has yielded relatively poor results in the way of radical cure. This may be attributed partly to the technical difficulties involved in the radical removal in one piece of the primary tumor and the adjacent lymphatics, partly to the mortality which attends extensive operations in this region, and partly, as in so many other forms of cancer, to the difficulty of early positive diagnosis of the disease. Under these conditions it was hoped that radium might offer a notable improvement in the treatment of these cases. This has proved to be true only to a very limited extent, and in suitable cases radical operation still remains the most effective treatment. It is true, of course, that the prognosis varies with the situation of the tumor, and that cancer of the lip is far more favorable for radical operation than cancer of the tongue or palate. It is also true that the size of the original lesion and its rapidity of dissemination vary in different individuals, so that generalizations in regard to cancer of any organ are open to criticism, yet, in the long run, the cases of mouth cancer form one of the most discouraging groups of cases with which the surgeon has to deal.

In the twenty-eight months from April, 1912, to January, 1916, one hundred and thirty-nine cases of mouth cancer presented themselves at the Huntington Hospital. They were divided as follows:

CARCINOMA OF THE TONGUE, MOUTH, ETC.

Lip	39	(Radium 19—Improvement 9)
Palate	8	
Lower Jaw	36	
Upper Jaw	11	(Radium 62—Improvement 9)
Tongue and Floor of Mouth	33	
Tonsil	7	
Cheek (Buccal)	5	
Total	139	

It is only fair to say that at the Huntington Hospital the radical operative treatment of cancer is the treatment which is advised and practiced in cases in which there is a reasonable prospect of success, and radium or other palliative treatment is advised or employed only in cases which for one reason or another are not suitable for operation. Thus

of the thirty-nine cases of cancer of the lip, nine were considered suitable for operation; six were operated upon at the Huntington or other hospitals, with subsequent freedom from recurrence; in two the results were unknown, and in one case operation failed to cure. Eleven cases received no treatment, and nineteen were given radium treatment. Of the nineteen cases treated by radium, four showed improvement, and four were apparently relieved of their disease, in that their tumors disappeared and no recurrence has yet made its appearance. The other eleven obtained but little benefit—these being chiefly cases in which extension to the cervical lymph glands had taken place. Squamous cell carcinoma in the lymph glands of the neck is very refractory to radium treatment, and with our present methods of treatment we can give but little hope that the progress of the disease will be materially delayed when this extension has occurred.

Eight cases of cancer of the palate, seven cases of cancer of the tonsil, and five cases of cancer of buccal mucosa were observed during this period—twenty cases in all, of which twelve had one or more radium treatments. No case showed anything more than temporary and symptomatic benefit, and the disease progressed with little or no delay toward a fatal termination. It is doubtful if radium was of material benefit in any of these cases, but in view of the fact that they offer a problem little different from that of cancer of the tongue or jaw, it is possible that larger dosage, and more aggressive radium treatment may give results in other cases, which have not been obtainable with the amount of radium available during the period covered by this report.

There were thirty-six cases of cancer of the lower jaw, and eleven cases of cancer of the antrum and upper jaw, in this series of cases. Twenty-eight of the forty-seven cases had one or more radium treatments. The upper jaw cases were all refractory, and the disease was not materially influenced by radium. Six of the lower jaw cases had definite benefit from radium, however, and in one case, a local recurrence after operation, the disease was destroyed and no further recurrence has appeared in twenty months.

There were thirty-three cases of cancer of the tongue and floor of mouth; of these one was suitable for operation and there has been no recurrence in two and a half years. Twenty-two were given radium treatment and in three definite improvement took place, although the disease was not eradicated. In these cases as in all cases of cancer of the mouth, the extension to the cervical lymphatics determines the limit of effective treatment by radium. The local lesion can be destroyed, or at least materially retarded in its growth, by active radium treatment in many cases, but when extension to the neck takes place the heavy treatments which can be used on the open ulcerated lesion in the mouth cannot be applied over the neck for fear of destruction of the skin, and its attendant complications, such as secondary hemorrhage. In cases of this character we have lately employed a combined treatment by radium and by operation. The neck dissection is done, as for a radical operation for cancer, and with the lymphatics removed and a barrier of scar tissue in their place to limit the spread of the disease, active and caustic radium treatment is applied to the local lesion in the mouth. By this method it is hoped that some cases otherwise hopeless may be given benefit, and although it is too early to report results the indications are definite that this method is one of promise for the future.

Leukoplakia-Buccalis. Eight cases of this disease occurred in this

series of cases, and four were treated by radium with a certain amount of success. It is unquestionable that radium employed in sufficient strength can cause the disappearance of the milky mucosa, but only by an actual caustic action. The tissue must be burned, and as the burn is extremely sensitive the cure is attended by great discomfort, out of proportion to the severity of the disease. It is our opinion that radium treatment in leukoplakia should be reserved for the more definitely thickened and indurated areas which give indication of existing or prospective malignant transformation, and that the soft, non-infiltrated lesions can best be treated by other methods, such as fulguration.

Before closing I feel that it would be a serious neglect if I did not speak before this audience of the vital importance of early diagnosis of these lesions. The dentist far more frequently than the physician has the opportunity to observe the early changes of the buccal mucous membranes which may later develop into malignant disease.

We all admit that we do not pretend to know the actual cause of cancer, and in many organs and situations we do not even recognize any predisposing cause, or any pre-existent lesion which commonly precedes the development of cancer itself. In some parts of the body, however, there are predisposing or "precancerous" lesions, as they are called, which are so constantly, or in such large proportion, the forerunners of cancer that we can only believe that some obscure but actual causal relation exists. I refer to the lesions produced by one or another form of chronic irritation. Instances of the role played by chronic irritation in the incidence of cancer are all too frequent. Perhaps the Kangri cancer of Kashmir is the most striking of many examples. In this case a source of irritation unknown in other countries is provided by the custom of the natives of Kashmir of maintaining the warmth of their bodies by a small flat stove, heated with charcoal, which they wrap in their clothing and place upon the skin of the abdominal wall. In other parts of the world the skin of the abdominal wall is practically an unknown situation for cancer to arise, but in Kashmir, as a result of this practice, cancer of this region is a common disease. The so-called smoker's cancer of the lip, thought to be due to the irritation of the hot pipe stem, is another example, and the occurrence of the disease in men about six times more frequently than in women appears to justify this hypothetical relation.

In the mouth sources of chronic irritation are all too frequent: pyorrhea, ill-fitting toothplates or jagged teeth, which wound and keep irritated the surface of the cheek, or of the tongue, are familiar examples that arise in dental practice. Many believe, also, that tobacco is a common source of irritation to the buccal mucosa, either by chemical irritation or from the heat engendered by its consumption in smoking. Leukoplakia, that extraordinary form of chronic productive inflammation of the buccal mucous membranes, is again a well-recognized point of origin of cancer of the mouth. Further examples are hardly needed to justify the statement that it is the duty of the physician or the dentist who discovers any one of he possible "precancerous" conditions, to warn the patient of the grave possibilities of his condition, and to procure for him appropriate treatment that the lesion may be cured before the more serious disease has actually begun.

In most cases the exact time at which a lesion, such as an ulcer, a fissure, or a patch of leukoplakia *begins* to be carcinoma is impossible to define. We see many doubtful but suspicious cases, and the proper treatment of such cases offers one of the most difficult problems with which we have to deal.

The best opinion of the present day is opposed to the exploratory excision of fragments of tissue for early cancer diagnosis, on the ground that cutting into cancer tissue tends to spread the disease. This is certainly true in such forms of internal cancer as cancer of the breast; and under all circumstances it should be avoided if possible, and if any tissue is to be excised for diagnosis the whole of the lesion should be removed. As a rule, however, the diagnosis can be made by other methods, and incision can be avoided.

The existence of an open ulceration in the mouth of more than two weeks' duration, and especially if it possesses an indurated margin, raises the question of cancer. Syphilis, tuberculosis, and some rarer lesions are ordinarily to be considered in diagnosis, as well as the "precancerous" fissures, dental ulcers, and leukoplakia. If syphilis, we do not now wait for the therapeutic test, but we get a Wassermann test. Again, with syphilis, one must remember that the presence of syphilis does not exclude cancer. In fact, it favors the diagnosis of cancer, for syphilis is one of the most common antecedent facts in the history of cancer of the mouth.

Tuberculosis of the tongue and mouth is almost invariably secondary to tuberculosis elsewhere, and is also a late rather than an early manifestation of the disease.

The ulcer due to a jagged tooth or to an illfitting plate depends for its recognition upon the presence of such a tooth or plate. When one of the "precancerous" lesions is present and there is doubt as to whether cancer has already begun, excision of the lesion by a good margin is the procedure to be advised. Such a specimen may be examined immediately in frozen sections, by a pathologist, and if the report is positive that cancer is present, the radical operation for cancer of that situation should be done at the same sitting, and under one anesthesia.

The radical operations for cancer of the tongue, jaw and palate are serious and mutilating operations. Cures result in some of the early and favorable cases, but the best treatment fill always be the prophylactic treatment which removes the causes and the results of chronic irritation before the change to malignancy has takn place. By the prophylactic treatment of these "prêcancerous" conditions the dentist has the opportunity to be of great service to his fellow men in preventing, or procuring early treatment for these most serious forms of malignant disease.

REVIEWS AND ABSTRACTS.

Radiography and Radio-Therapeutics. By Robert Knox, M. D., M.R.C.S., L.R.C.P., Consulting Radiologist, Great Northern Central Hospital, London. Part II: Radio-Therapeutics. Cloth. Price $6.50. Pp. 606, with 115 illustrations. New York: The Macmillan Company, 1918.

This excellent work should find a place in every medical practitioner's library, as it presents the subject of x-ray and radium therapeutics authoritatively and comprehensively.

An introductory chapter deals principally with the action of radiations upon normal and neoplastic tissues. Excellent microphotographs illustrate the changes produced by the x-rays and the radium rays. Attention is called to the dangers attendant on the use of x-rays and radium.

Referring more particularly to that part dealing with radium and radium-therapy there is an excellent chapter on the physics of radium by C. E. S. Phillips, F.R.S.E.

The following are the chapter heads and subheads under Radium Therapy and the Combined Use of Radium and X-rays (110 pages).

RADIUM THERAPY.

PHYSICS OF RADIUM BY C. E. S. PHILLIPS, F. R. S. E.

Ionisation and recombination—radium emanation—measurement—physiological action.

THE PRACTICAL APPLICATION OF RADIUM TO DISEASE

Methods of using radium—A good method of utilizing a limited quantity of radium—Filtration of radium rays—Radium tubes in the substance of a tumor—Treatment of deep-seated tumors by external applications.

Dosage in Radium Therapy.
Relation between the value of radium and its activity.
Radium in General Diseases.
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Radium in Diseases of the Ear, Nose and Throat.
Radium in the Treatment of Exophthalmic Goitre.
Malignant Disease of the Thyroid Gland.
Radium in the Treatment of Diseases of the Skin.
Radium in Gynecological Practice.
Radium in Superficial Epithelioma and Rodent Ulcer.
Radium in Infiltrating Epithelioma.
Radium in Sarcomata and Carcinomata.
Radium in Cancer of the Tongue and Mouth.
Radium in Cancer of the Oesophagus.
Radium in Cancer of the Rectum, the Prostrate Gland and the Bladder.

THE COMBINED USE OF RADIUM AND X-RAYS IN THE TREATMENT OF MALIGNANT DISEASE

In the Treatment of Injuries and Diseases Met With in Military Practice. Equipment of a radio-therapeutic department—Description of types of cases met with in military practice, with special points in technique—Treatment of chronic sinuses and septic wounds by combined x-ray and ultra-violet radiations.

The Value of Radiations in Plastic Surgery of the Face and Jaws. By Percival P. Cole, M.B., F.R.C.S. Special points in the technique employed in the treatment of cases dealt with by Mr. Cole.

GENERAL DISEASES MET WITH IN MILITARY PRACTICE

Exophthalmic goitre—Graves', Bazedow's, or Parry's disease—Enlargement of the thymus gland alone or associated with hyperthyroidism—Radium in the treatment of hyperthyroidism.

The illustrations are very well chosen and the press work is well done. On the whole this is one of the most valuable texts on radio therapy that has appeared, and certainly one of the most useful and up-to-date works on this subject in English.

* * * * *

James Albert Corscaden, M. D. (New York)—The Rationale of Radiotherapy in Uterine Hemorrhage. American Journal of Obsterics and Diseases of Women and Children, LXXVII, 250-272, February, 1918.

"As more and more conditions, particularly those of a gynecological nature, are found to be improved by radiotherapy and others to be unimproved or made worse, the principles underlying the action and application of this agent become more and more clarified. The most easily demonstrated effects are those on the cellular structures of the body. The tissue changes are well enough defined so that we may deduce the symptomatic result if we only be sure of the functions of the tissues concerned. Functional or secretory changes in the cell are more difficult to follow but studies on emzyme action and cell permeability in unicellular organisms seem to show that the effect is on the structure rather than on the function of the cell."

"These changes are readily followed in the organs and tissues concerned with menstruation. Although of course most of the tissues of the body have at some time a relationship to menstruation, the tissues most intimately involved are those of the ovary, uterine muscle and vessels and the endometrium. There have been so few specimens of endometrium removed after radiotherapy that a true estimate of the effect is difficult to make. My own material is limited to one specimen taken after x-ray treatment which showed only a normal membrane of the post-menstrual type. With radium, however, it is difficult to see how the dosage necessary to produce amenorrhea could fail to have some destructive effect on the endometrium. Much lighter doses cause severe burns on other epithelial surfaces; moreover a discharge often persists for some time after radium treatment as if from an irritated mucosa. That it is temporary is shown by the return of menstruation after a light dosage and by numerous cases of pregnancy which have occurred in women previously exposed to the rays."

"The uterine muscle is particularly resistant to the rays. It is upon this that we depend for protection in giving enormous doses to carcinoma of the uterus. Direct experiment on animal uteri and on chick's heart muscle, etc., demonstrates the same resistance."

"The more penetrating x-rays and the gamma rays of radium produce an endarteritis which is often quite marked. While very definite, the change is not more particularly marked than that which is often seen in the so-called fibrotic uteri or chronic metritis, or more often in the vessels of the majority of fibromyomata."

"In the ovaries on the other hand there are very distinctive changes. Beginning a few hours after exposure to an erythematous dose of penetrating highly filtered rays in the more fully developed Graafian follicle, there begins a breaking up of the nuclei which becomes marked in two or three days while the primordial follicles seem to be resistant and are only affected by enormous doses. At the end of about ten days the architecture of the mature follicle is almost lost. This effect is one of the most striking of all those caused by the rays on any of the structures of the body."

"The symptomatic results of such changes are easily traced. The Graafian follicle ultimately develops into a corpus luteum and, whatever the mechanism, there is little doubt that the latter controls menstruation and that without a corpus luteum formation menstruation will cease."

"If then the x-rays destroys the Graafian follicle and the follicular apparatus controls menstruation, then a proper dosage of x-ray must stop menstruation. On this conclusion rests the permanent success of radiotherapy for uterine bleeding."

"Do these principles apply also to abnormal uterine bleeding? Are variations in the frequency, amount, duration and character of uterine

bleeding of such degrees as to be called pathological, governed by variations in the functional activities of the structures controlling menstruation or are they brought about by newly developing anatomical lesions in the uterine lining or walls. Anatomical lesions have been given as causes of uterine bleeding; chronic endometritis, fibrosis of the uterus or chronic metritis, arteriosclerosis of uterine vessels, syphilis and tuberculosis of the uterus, chronic passive congestion of local origin (displacement of uterus, tumors of uterus and of other pelvic structures) and of remote origin (heart failure, abdominal tumors, etc.); by high blood pressure, active congestion from inflammation in the uterus or adnexa and from ulcerations or congestion in fibromyomata."

"It has been so definitely demonstrated that chronic endometritis is a misnomer for hyperplasia of the endometrium and that fibrosis of the uterus (chronic metritis) bears no extraordinary relationship to uterine hemorrhage that mention of it would not be made were these principles not still guiding many in their treatment of this symptom. I bring them up simply to draw attention to the gradually prevailing view as expressed in an extensive literature that the bleeding in these conditions is due to extrauterine agencies, alterations in the menstrual mechanism, to correct which we must attack some link in the menstrual cycle, particularly destruction of either the corpus luteum or the endometrium, for, while the other organs of internal secretion may profoundly effect menstruation, all of them may be excised without any effect upon it."

"While the situation is fairly clear with regard to the above conditions, the relation of uterine hemorrhage to active and passive congestion and to fibromyoma of the uterus is less so. In an attempt to estimate the importance of the various anatomical lesions in uterine hemorrhage Dr. Clifford Goodman and I are making a statistical study of several hundred cases at the Presbyterian Hospital which we hope to present formally at a later date. Thus far the only condition in our series in which passive congestion might possibly be considered a cause is retroversion. There have been one or two cases of menorrhagia which have become normal after the uterus has been put into position by a pessary. Statistically, however, retroversion coincides with uterine bleeding with slightly less frequency than chronic appendicitis and we have gained a preliminary impression that the coincidence merely follows the law of chances. Pyosalpinx is somewhat frequent, indicating perhaps that active congestion may indeed play a role. Fibromyoma as may be supposed occurs with considerable frequency. Our statistics do not convey a true estimate of bleeding in fibromyoma, however, since practically all of them were sent for treatment of this symptom. As to the cause of the bleeding with the fibroid we have found little to offer and must refer simply to the two conflicting current ideas, the first or more popular of which ascribes the bleeding to ulceration or congestion in the fibroid or uterine vessels, while the second seeks a biochemical factor or hormone action. It is true that in our series hyperplasia of the endometrium has been the rule and this might lead one to think that somewhat the same agencies are at work in the bleeding of fibromyomata as in the other hyperplasias of the endometrium. It is also interesting to note that the effect of radiotherapy is precisely the same where a fibromyoma is present as where it is absent, indicating that even though congestion may have some importance it is not the essential factor in the bleeding."

"Ulcerations such as in carcinoma and the erosions or pedunculated intrauterine masses like a polyp, cause bleeding as they would in any part

of the body irrespective of menstruation and must be handled accordingly."

"In practice these principles are directed toward two large groups, those cases of uterine bleeding which show no gross changes in the uterus and those associated with the fibromyoma of the uterus. The former type occurs most commonly at the beginning or at the end of the child-bearing period but also with some frequency at any time during the active period and includes the conditions known as chronic endometritis and metritis. The onset of the bleeding in the active child bearing period has coincided peculiarly with some more or less severe trauma to the body such as childbirth or operation, particularly those performed on the genital structures."

"In the older women the whole procedure is very simple. Carcinoma is excluded by curettage; they are given a stated massive dose, may or may not have a period or two and then pass with invariable certainty into the menopause."

"Occasionally the first period is profuse; why it should be so is not proven. One may infer that it is because the destruction of the corpus luteum throws endocellular substances into the blood stream which are similar to the normal secretions which excite the endometrium to activity."

"With girls at the age of puberty two methods are in vogue. The first is to give a moderately large dose and to await results, the other is to give small repeated doses following each period, gauging subsequent doses by the effect on each following period. Exposures are given at the end of the period so that the effect of the primary stimulation above mentioned may be minimized. One must for this same reason be cautious in this mode of application. The period following the first couple of exposures may be profuse. The operator, feeling that the dose is insufficient, gives a stronger one which turns out to be excessive because the profuse bleeding was not due to the action of the original causes but to the stimulation of the rays. Such a case is the only one in the following series where the patient has been utterly displeased with the result. Each individual, where a temporary menopause is desired, must have the dosage determined and it is impossible to foretell what dosage any particular individual may need. This is well illustrated by two cases of sixteen-year-old girls; one of whom was made amenorrheic for eight months by a dose of x-ray one-eighth as large as that given to the other girl with barely any appreciable effect on the bleeding."

"At any time in the child-bearing period a positive result can with more or less ease be certainly obtained. I believe that the cause of the bleeding in all of them is a failure of some element in the menstrual mechanism, particularly the Graafian follicle, influenced largely by all the glands of internal secretion, especially the thyroid. In the late child-bearing period this failure indicates the beginning of the natural menopause and should be regarded as a more or less natural process. What more simple than to hasten this process in the ovary so that the discomforts and dangers of the hemorrhage be confined to one or two periods instead of being allowed to drag along for months and years? The menopause is due in a short time no matter what is done, and the women will be saved a great economic and physical loss."

"In the younger girls on the other hand this lack of balance is one of deficient development coming on in the growing period when the Graafian follicle should be most perfect. Treatment of this disorder should be reconstructive rather than destructive and the application of destructive radiotherapy should be reserved for those cases where other

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means have failed. Eventually, no doubt, by proper endocrinological diagnostic methods and the development of actual glandular substances we may hope to restore this disturbed balance. At present, when most of such efforts are hazy and glandular substances crude we are compelled to resort to radiotherapy."

"SUMMARY OF THE USE OF RADIOTHERAPY IN GROSSLY NORMAL UTERI—1. Radiant energy exerts a specific destructive effect on the Graafian follicle."

"2. Menstruation is dependent on and controlled by a corpus luteum formation."

"3. Destruction of the Graafian follicle must cause therefore an amenorrhea."

"4. The majority of abnormal uterine hemorrhages are due to disturbances in the menstrual mechanism and not to local mechanical causes, therefore these bleedings must cease in the same manner as normal menstruation, under radiotherapy."

"5. Added to the effect on the corpus luteum, radium has a local cauterizing effect on the uterine cavity."

"6. In women of the late child-bearing period radiotherapy is the procedure of choice."

"7. In girls radiotherapy should be used as a late procedure."

"8. The induction of the artificial menopause for economic reasons is possible. Whether it is justifiable or not is a matter for discussion."

TREATMENT OF FIBROMYOMA.—In order to properly estimate the position of radiotherapy in the treatment of hemorrhage associated with fibromyoma, it is necessary to refer to the treatment in general. This is governed by two fundamentally opposed ideas, the first of which assumes that the myoma constitutes a menace, whether giving symptoms or not, because of the possibility of sarcoma, the possible coincidence of carcinoma and because of errors in diagnosis which overlook diseases of the adnexa. The second proposes treatment of fibromyomata only when they cause symptoms, arguing that sarcoma is extremely rare and that the so-called sarcomatous changes are, in the vast majority of cases, bizzarre cell pictures which do not indicate true malignancy and can be discovered in almost any myoma if searched for long enough; and that carcinoma must be treated as carcinoma *per se*, whether there be a fibroid present or not, since the hysterectomy which is designed for the fibroid is different from that which should be performed for carcinoma. No matter what the line of treatment designed for the coincident fibroid the carcinoma must be ruled out because of its frequency (5 per cent.) and, if found, appropriately treated."

"Of the conditions likely to be overlooked on examination, the inflammations are indeed helped by radiotherapy. Ovarian tumors, on the other hand, should be removed and if doubt exists as to their presence an exploratory incision made."

"If the diagnosis is clear and it is granted that we treat fibromyoma only for symptoms the latter may be conveniently divided into those of a mechanical nature (pressure, interference with child-birth, rapid growth and large size, say 15 cm. or over), and secondly hemorrhage."

"After radiotherapy our results show that the hemorrhage is controlled precisely as in the normal uterus, and secondly whether from uterine anemia following the artificial menopause and endoarteritis in the tumor or from questionable action on the smooth muscle cells, the tumor mass will shrink to a marked degree after several months. Since these effects are so reasonably certain, what shall be the limits of their applica-

tion? In some of the more radical clinics practically no clear-cut cases of fibromyomata are operated upon; in other clinics only the exceptional, usually the inoperable case is treated by radiotherapy. The proper application of this method lies somewhere between."

"The most important use of radiotherapy is to stop hemorrhage. If this be the only symptom, its cure puts the fibroid back again in the symptomless group which we agree does not require treatment. If the mechanical symptoms, pressure, etc., predominate they should be treated mechanically, *i. e.*, by proper operative procedure, maintaining, however, a much stricter standard of operative risk than obtained before radiotherapy was in vogue. Minor contraindications which were previously passed over, now require the employment of radiotherapy."

"The age of the patient is important. A permanent amenorrhea is necessary to insure a permanent result and although eventually obtained, is more difficult in the younger women and is at the same time less desirable, although the discomforts of the menopause in those younger women are not as great as I had been led to believe. Young women who have temporary menopause symptoms from radiotherapy have been asked whether they would prefer to have a laparotomy performed again or to have the menopause symptoms made permanent. All have preferred the menopause. Nevertheless the ideal patient for radiotherapy is a women of thirty-eight or over and an operation becomes more and more desirable as the age is lower. Repeated mild doses will keep a mass down to a small size but the mental strain of two or three years continued radiotherapy I believe to be more disagreeable than the discomforts following a hysterectomy."

"Summing up the ideas governing radiotherapy in fibromyomata—

1. Results show that amenorrhea follows radiotherapy in fibromyoma of the uterus precisely as it does in uterine bleeding from a grossly normal uterus."

"2. Following radiotherapy the mass shrinks to a marked degree, often so much as to escape the examining finger."

"3. Fibromyomata should remain untreated unless they cause symptoms."

"4. When the symptom to be treated is hemorrhage, radiotherapy is the treatment par excellence, because it puts the condition again in the symptomless class."

"5. Since the amenorrhea should be permanent, radiotherapy is best indicated in women of thirty-eight or over and restricted more and more as the age is lower."

"6. Where mechanical symptoms predominate they are best treated mechanically, *i. e.*, by operations."

"CARCINOMA OF THE UTERUS.—While carcinoma is properly out of the scope of this paper, since the hemorrhage of carcinoma although important is of small importance compared with the other dangers of the disease, nevertheless allusion should be made to the treatment here. Eight inoperable cases have been treated in the last nine months by radium and the immediate results have been in accordance with those reported from many sources. Within five or six days after the intrauterine administration of 2400 mg.-hours of radium in carcinoma of the cervix a copious bloody, watery discharge present for eight months almost completely ceased in five days. In one case a crater measuring 5 or 8 cm. in diameter shrank in six months so as to feel about like a cervix which has been amputated, except that the consistence was much harder. In each

of the cases more or less severe bleeding has been a symptom and has been completely stopped up to the present."

"About the same number of inoperable carcinomata of the cervix has been treated by the Percy dull heat method. So far improvement after radium has been just as rapid and as far as this interval indicates just as complete. The hospital stay after radium application is usually about forty-eight hours while that following cauterization varies from four to six weeks, during which the patient passes through a fairly uncomfortable convalescence. So far no accidents have followed the application of radium. Two of the eight cases treated by the Percy method developed vesicovaginal fistulæ. One case treated by the Percy method recurred after six months, was heated again, recurred after a few months, was referred to the Memorial Hospital and was given radium treatment and on last examination, two years after the first radium exposure, the vagina is filled with scar tissue but no definite local or general evidence of carcinoma is present."

"Bleeding from erosions and polyps has not been treated by radiotherapy by us."

A tabulation is given which represents fourty-four cases in women of thirty-eight or over treated by x-ray; eight cases in women under twenty-five treated by x-ray; four cases in women of from thirty to thirty-five treated by x-ray.

"There are nine cases in women over thirty-eight treated by radium; one case in a woman of thirty-one treated by radium. Among women of thirty-eight or over there are twenty-two cases of fibromyoma. Among women between thirty and thirty-five, two cases of fibromyoma."

"The results are tabulated according to the immediate or remote effects upon the uterine bleeding, on the changes of the physical signs following the treatment, and the secondary effects of the radiotherapy immediately following the treatments or coming on at a distant date."

"In the women of thirty-eight or over treated by x-ray, menstruation ceased after no further bleeding in one case, after one period in twelve cases, after two periods in twenty-one cases, after three periods in three cases, after intermittent dribbling lasting for several weeks in three cases. In one obese subject scant menstruation with coincident hot flushes continued for four months after x-ray treatment was begun and was stopped completely by an application of radium. In one case, after a small dosage, bleeding returned after a few months and ceased after further x-ray treatment. One woman has continued for two years to have periods every few months after a small dose of x-ray. One case had a period several months after the original x-ray dose but none since."

"The uterine bleeding in eight girls has been controlled with varying success in all cases. In three of them something approaching a regular menstrual period was accomplished. In the other five varying periods of amenorrhea were induced; one, to judge by the severity of the hot flushes, will be persistent for a long time, having covered nine months up to the present."

"In women at the height of the child-bearing period, one had a small dosage with scant periods for a few months and then a return to the previous condition."

"One woman is permanently amenorrheic after a moderate dose."

"One woman with fibroid is amenorrheic after receiving a massive dose twice with an interval of a year, having during the year seven periods during which the size of her uterus remained the same."

"One woman had regular periods following a moderate dose, then

because of excessive flow was again exposed and was persistently amenorrheic."

"The results of the cases treated by radium are too recent to be suitable for summarizing. In general, amenorrhea occurs after one period. The profuse first period following x-ray has only a mild counterpart after radium installation. Menopause ensues with the same regularity as with x-ray."

LATE RESULTS ON THE SIZE OF TUMOR MASS.

Fibroids forming with fundus a mass up to 7 cm. in size.
At the end of 8 months 1 case uterus has nodular contour, normal size.
At the end of 9 months 1 case uterus has normal contour, normal size.
At the end of 1 year 1 case uterus has normal contour, normal size.
Fibroids measuring from 7 to 10 cm. diameter.
At the end of 6 months 1 case measured 6 cm. diameter globular contour.
At the end of 8 months 1 case measured 6 cm. diameter nodular contour.
At the end of 1 year 1 case measured 6 cm. diameter nodular contour.
At the end of 1 year 1 case measured 6 cm. diameter nodular contour.
At the end of 3 years 1 case measured 4 cm. diameter nodular contour.
Fibroids measuring from 10 to 15 cm. diameter.
At the end of 9 months 1 case measured 6 cm. diameter globular contour.
At the end of 2 years 2 cases measured 6 cm. diameter normal contour.
At the end of 2 years 1 case measured 8 cm. diameter globular contour.
At the end of 3 years 1 case measured 5 cm. diameter globular contour.
Fibroids measuring 18 cm. in diameter.
At the end of 6 months 1 case measured 15 cm. diameter lobulated.
At the end of 2 years 1 case measured 6 cm. diameter nodular.

Measurements made by a modified pelvimeter. The thickness of the abdominal wall was estimated and deducted. This constant deduction was made at each examination."

"The secondary results of x-ray treatment have practically simulated the normal menopause. There have been a few gains in weight but no adiposis. The only characteristic symptom of the menopause has been the onset of hot flushes; this has been serious in one case, absent in two cases, moderate in the rest of the women of thirty-eight or over, and severe in one young woman, absent in four, moderate in the rest. One woman showed albumin and casts in the urine, which was examined because of slight puffiness over the tibiæ, one woman with a double polycystic kidney had an uremic convulsion six months after the treatment had ceased. Whether it was due to the treatment or not it is difficult to say. Unfortunately routine urinary examinations have not been made on these cases; no doubt minor urinary changes would be more often discovered. Dangers of x-ray dermatitis are so remote with modern technic that they need little discussion. The very first case treated had a small burn caused by the shifting of some poorly applied lead plates. Occasionally a slight erythema has appeared after heavy dosage."

"Comparing the x-ray and radium it may be said that radium is preferable in practically all cases except younger women in whom small repeated doses may be desired. While the actual amount of time consumed in the treatment is about the same in both, that devoted to x-ray is spread over from six to ten weeks, while the radium is finished in twenty-four hours. Usually a whiff of nitrous oxide has to be given for the insertion of the radium. Since practically all of the older women should be curetted to exclude carcinoma both procedures are carried out at the same time."

"In conclusion it may be said that uterine hemorrhage from almost any cause may be stopped by the intrauterine application of radium and that the hemorrhage from disturbed menstruation with or without fibrom-

yoma may be controlled by the x-ray. Also practically all fibromyomata will shrink to a satisfactory degree after radiotherapy."

"Practically no harm results from radiotherapy in these cases."

"All cases of hemorrhage from a grossly normal uterus in women of thirty-eight or over should be treated by radiotherapy after carcinoma has been ruled out. In younger women radiotherapy would be used as a late resort. In cases of uterine hemorrhage associated with fibromyoma of the uterus, radiotherapy is the proper treatment, if symptoms from mechanical causes are absent and the woman is thirty-eight or over."

* * * * *

JOSEPH B. BISSEL, M. D. (NEW YORK).—Radium Treatment of Lymphosarcoma of Neck and Face. International Journal of Surgery, XXXI, 112-115, April, 1918.

"Lymphosarcoma is a malignant neoplasm belonging to the round-celled sarcoma type. It is a proliferation of atypical primitive lymphoid cells. It is almost universal throughout the lymphoid tissues when it once begins. A diphtheroid looking bacillus is identical with the similar one found at times in other swellings, such as Hodgkin's disease. Hodgkin's disease resembles lymphosarcoma and is often preliminary to its appearance. The growth in Hodgkin's disease is a granuloma, while lymphosarcoma is a neoplasm."

"Ewing describes lymphosarcoma as an endothelioma of the lymph nodes—at least in its origin. The classification of this lesion is far from satisfactory or definite. The history of lymphosarcoma often shows it arising in a local infection, as for instance in the tonsil or other lymphoid structure metastasizing, from this point and speedily reaching the lymphatic system of the body. The more rapid the infection the more quickly fatal the result, death taking place within a period of from several months to two years. These growths occur at all ages and in all parts of the body, following the course of the lymphatic system. They are more frequent in some locations than in others. They occur often in the lymphatics of the neck and chest and especially as mediastinal tumors. In the mediastinum malignant growths are more common in occurrence than benign tumors. The unclassified mediastinal growths are probably more frequently lymphosarcomata than other new growths. They are usually secondary to malignancy elsewhere."

"Lymphosarcoma interests the surgeon particularly from three viewpoints: First, its rapid malignancy; second, its wide dissemination, and third, the impotency of operative surgical treatment. Because of its inherent qualities, surgical procedures to be efficient against this disease must include removal of all of the growth. Often this is practically impossible, more especially in cases involving the neck and mediastinum. The prognosis is a desperate, almost hopeless one. The invariable tendency of round-celled sarcoma to disseminate, so that in some cases it infects almost every organ in the body, proclaims the helplessness of surgery."

"Kelly and Burnam, in a recent statement, attribute the cause of lymphosarcoma of the neck to local infection. If this be true and the local infection can be detected early enough, and if it can be circumscribed, the complete removal of the disease is still within the reach of the surgeon."

"In all the cases of this trouble with which I am familiar, the etiology had not been satisfactorily determined and the treatment has to be undertaken as a rule after metastases have appeared and during the period of rapid growth."

"The tumors which come to us for treatment are usually multiple, inaccessible to complete removal, and therefore beyond the reach of cure by the knife."

"Most of the patients have chest sarcoma tumors which cannot be reached for microscopical examination. Pathologically, it cannot be said with certainty in every case that they were lymphosarcomas. Clinically, however, they had the usual characteristics of these growths except for the one salient feature of their disappearance under treatment."

"The Roentgen ray, which is our most reliable diagnostic aid in these patients, reveals by shadow the presence of the tumor in this region, and repeated roentgenograms taken from time to time later show its progress or diminution."

"Differential diagnosis between other forms of malignant disease and benign growths can be made only from the history and clinical symptoms together with the general examination. When the tumor is accessible, as in the supraclavicular region, removal of a section for the pathological laboratory will give a positive means of identification."

"Whether the neoplasm is primary or secondary makes little difference as to treatment, if all of the malignancy can be reached."

"The following cases have been thought worthy of special record:

CASE 1. Baby G., 12 months old, seen January 3rd, 1917. Two irregular nodules were present in the left clavicular region, connected with a deep-seated growth extending into the mediastinum. They appeared about two months ago and grew rapidly. A section was easily removed, and a microscopical examination reported it to be a lymphosarcoma. Six applications of 100 milligrams of radium, one week apart, caused the disappearance of the growth. It has not returned to date."

"CASE 2. J. D., 59 years old, seen December 1st, 1916. There was a nodule of the size of a hazel nut in the right supra-clavicular region. It was not tender, but in the past few weeks it had begun to increase rapidly. It seemed to be deeply attached. Removal under cocain anesthesia of a portion of the size of a lima bean and examination showed it to be a gland which contained the characteristic, finely reticulated network of round cells and vessels of lymphosarcoma. He was treated with repeated applications of small quantities of radium, 10 milligrams for one hour, very lightly screened. Considerable burning occurred, but the deeper seated mass, which grew rapidly to the surface after the removal of the gland, disappeared. He had upwards of 20 seances. Examination January 1st, 1918, showed no recurrence."

"CASE 3. F. N., 30 years old, seen April 7th, 1917. The patient had a lobular, irregular shaped mass on the left side of the neck extending from just below the ear to within an inch of the clavicle. In the past month the growth had doubled its size. It resembled a number of lipomata adherent to each other and measured about 8 inches in its vertical diameter by 5 inches from side to side. Several hundred milligrams of radium, heavily screened with lead and rubber, applied one to two hours for four visits, and three fourteen-hour applications with the same screening plus distance screening, was followed by complete disappearance of the growths. There has been no return to date."

"CASE 4. Miss L., 22 years old, seen November 2nd, 1916. In the

past three or four months she had suffered from difficulty of breathing and pain in the middle upper chest region, with irritable cough, and had been unable to sleep in the reclining position. She was a marked neurasthenic. A few weeks ago a mass was noticed in the sternal notch, not tender but increasing rapidly in extent. All symptoms were growing rapidly worse. X-ray examination revealed a shadow in the middle mediastinum extending upward to the left. It had pushed the heart shadow well over to the left. Applications of several hundred milligrams of radium were made for six hours. The radium was in two packages, changed to different parts of the chest every hour, well screened with lead and rubber, 2 mm. of lead and 12 mm. of special rubber, no distance screen. There was no local or general reaction after the application. The patient's symptoms were markedly alleviated for several weeks. December 10th, 1916, similar treatment was given for 18 hours, the radium being changed three times. Again marked improvement occurred. January 15th, 1917, she had another application for the same period; the radium was spread out in 8 packages with small screening and remained as applied for 19 hours. This produced a slight but very tenacious erythema. Within a few days the apnea and sternal tumor disappeared. The shadow is almost gone and the other symptoms are no longer well defined or at all troublesome."

"Case 5. Boy, 19 years old, from a neighboring city, with a history of becoming slowly paralyzed in the past six months. The left side was more affected than the right, from the neck to the arms, finally including both legs. Dyspnea and a choking sensation, together with pain in neck and chest, were the other symptoms. Nutrition and appetite were good, and he had a remarkably cheerful disposition. The x-ray showed the shadow of an extensively thick and large mediastinal tumor, said to be a lymphosarcoma. The patient was seen April 10th, 1915, and for a short time applications of radium, lightly screened, were made. No local reaction followed. The dyspnea, difficulty in breathing and choking at once began to improve. He was treated again at the end of ten days with repeated applications of radium of various amounts and for various periods, changing the application to different surfaces over the site of the lesion and using rather heavy screenage. All his symptoms continued to improve until the latter part of August, when he went back to his home with only his left leg incapable of complete use. He walked out with crutches, having been brought in on a stretcher. The roentgenogram showed marked diminution of the shadow, but not its complete disappearance. He died about twelve months later of what was said to be a recurrence of the tumor in the abdomen."

"Case 6. Girl, 7 years of age, seen March 5th, 1915. There was an irregularly lobulated growth on the left side of the neck in front and behind the mastoid muscle, extending into the chest. Pain was present at the sternal notch, with dyspnea, cough, and slight distress in swallowing. The growth was seen first a few months ago and later began to grow rapidly. Roentgenograms showed a very distinct and large shadow in the posterior mediastinum. Three applications of radium in divided and changing amounts were made, seven days apart. After the first and second visits all the symptoms were markedly relieved, and the neck tumors and x-ray shadow diminished rapidly. She went home to the country, and in September returned with tumors on both sides of the neck and a marked shadow filling the mediastinum, so that the heart was pushed to the left. The same treatment again produced great re-

lief and comfort. She died early in 1916 following an operation for osteo-sarcoma of the sternum. She had left my control at that time."

"Case 7. Sister E., a religious, 54 years of age, seen June 3rd, 1917. For the past five months the patient had noticed a lump on the left side of her neck in front of the mastoid muscle, about one inch and a half above the clavicle. Some pain in chest and difficulty in breathing. Lately the lump had increased rapidly, and she had an irregular mass in front of, beneath and behind the muscle, passing down into the thorax, and slight tenderness on deep pressure. She had pain, especially at night, behind the upper part of the sternum, and an abdominal growth was felt in the left hypochondrium. Skiagrams showed a large mass filling the mediastinum in its upper two-thirds and extending downward to the left. Several hundred milligrams of radium were applied, scattered over the region of the tumor in the neck and thorax, for two hours every five days, and brought relief from the symptoms. After three applications the tumors in the neck were reduced so as to be hardly palpable. The difficulty of breathing was relieved, and the pain behind the sternum was less marked. The x-ray showed still some shadow. During the summer, treatment was intermittent. October 20th, 1917, the tumors in the neck were found to have returned; the pain under the sternum was now quite constant instead of nocturnal only. Altogether the patient had retrograded. She is still under treatment, but except for temporary improvement her condition is unsatisfactory."

"Case 8. Mr. C., 45 years old, patient of Dr. S., seen December 10th, 1914. A few weeks before a well-known surgeon had skillfully removed a tumor arising behind the sternum and extending into the neck on either side. The wound healed normally, but shortly after the tumor again appeared. Except for a small swelling at the top of the sternum the patient had no other symptoms besides a slight difficulty of breathing. No x-ray was taken. The pathological examination of the specimen showed it to be a lymphosarcoma. One hundred and forty milligrams of radium over the tumor and the sternum was applied for 24 hours. At the end of two weeks very little of the growth could be seen. The treatment was then repeated. He returned at the end of a fortnight with some erythema of radium origin, but the tumor had disappeared and the dyspnea was also relieved. He remains well at this writing."

"Case 9. Mr. E. G., 28 years old, presented a small tumor, irregular in shape, arising behind the suprasternal notch, extending towards the left supraclavicular region, not tender or attached to the skin. Patient had noticed this two weeks previous to his first visit on April 12th, 1916. He complained also of slight pain behind the sternoclavicular junction, and had some difficulty in swallowing food and a slight cough. A skiagraph revealed a shadow the size of an orange in the mediastinal region, extending upwards and to the left. Three hundred and forty milligrams of radium were applied for eight hours over the site of the tumors and the shadow. The patient seemed to be relieved of pain and cough inside of 48 hours. The second and third applications of radium in smaller amounts were made at intervals of three weeks. A week after the last application there was no evidence of the tumor of the neck. The x-ray showed a shadow still present, but much less marked in degree and density. The patient reported a few weeks ago that there was no return of the growth. The cough and dyspnea have not recurred."

"Case 10. Boy, 7 years old, had a rapidly growing mass several inches in diameter removed from the left side of his neck several weeks

ago at Bellevue Hospital. December 7th, 1916, when seen, he was still suffering from shortness of breath, cough and pains in the chest, radiating around the ribs from the back and occasionally extending into the legs. The pathological report of the tumor was a lymphosarcoma. The x-ray revealed a large mass in the mediastinum. None of the symptoms had been relieved by the operation. December 10th, 1916, several hundred milligrams of radium were applied over the sternum for eight hours and also along the course of the healed scar on the left side of the neck. On the next day the pains were less and the cough and dyspnea were markedly diminished. Three applications, seven days apart, were made in this manner, time and location. Improvement was steady. At the end of three weeks an x-ray of the mediastinum showed a great decrease in the size of the shadow, as well as its density. No picture has been taken since January 1st, 1917, although several radiations have been given. The tumor did not return and the patient is now free from any distressing symptoms."

"Of the above ten cases, all but one responded well and rapidly to the radium, which was used in comparatively small amounts for short periods of time. The screening varied, depending somewhat upon the length of time it was applied, the amount, the normal tissues to be affected, and the depth of the growth. Most of these cases responded quickly, one or two in an extraordinarily rapid manner. The two post-operative cases were most satisfactory in the result obtained."

"Conclusions—1st. Lymphosarcomata, because of their wide dissemination, rapid growth and impossibility of complete removal by the knife locally, are not favorable cases for operation."

"2nd. Radium acts at times on such growths with extraordinary quickness and certainty."

"3rd. The action of the radium depends upon the age of the growth, its extent, the size of the involvement and its location, as well as upon the technic of the application itself."

"4th. Operation is indicated only when the growth can be completely removed together with wide amounts of the surrounding tissue, and it should always be followed by radium treatment."

* * * * *

J. T. Case, M. D.: Comparison of the Operative and Radiotherapeutic Treatment of Uterine Myomas. Surg. Clin. Chicago, 1917, i, 579. Abstracted in Surg., Gynec. & Obst., December 1917, p. 559.

"The writer, referring to former papers, assumes that roentgen rays and the rays of radium are practically identical, the choice being largely a matter of convenience in application. He then proceeds to contrast radiation and operative surgery, as follows:

"1. Radiation, no mortality; operation, 2 or 3 per cent."

"2. Radiation, a certain remote danger of necrosis or malignant degeneration, which is absent after operation."

"3. The discomfort of the patient from "roentgenkater" and the repeated treatments Case believes to be at least equal to, if not greater than, operative shock and recovery."

"4. The possible mal-effect on the skin and the probable narrowing of the vagina (after radium) are placed against the operative scar and possible hernia."

"5. Ovaries completely destroyed by radiation and often completely, or at least partly, saved by operation."

"6. Radiation must be rather general while, by operation, myomectomy is often possible."

"7. And, as of rather more importance, Case considers the added probability of accurate diagnosis by an open operation."

"In conclusion, 'only cases of uncomplicated intramural fibroids, or cases in which operation is declined or contra-indicated by serious organic disease, should be subjected to ray treatment. Possibly there are some extremely neurotic individuals for whom the rays would also be preferable. The ray treatment should not be used when time is a factor, and it cannot be used with safety in rapidly growing tumors, in fibroids complicating pregnancy, or where serious disease exists in the tubes or ovaries. The rays should never be used in any case where complete preliminary curettage with microscopic examination of the curettings is not feasible.'"

* * * * *

M. Lannois and Moutet. Radium Treatment of Neoplasms in the Tonsils. Lyon Medical, cxxvi, 495, Nov., 1917. Abstracted in Jour. A. M. A., Jan., 26, 1918, p. 273.

"Lannois and Moutet report the present condition of patients given radium treatment a year or more ago. One young man has nothing left of his tonsils and the enlarged glands in the neck and axillae have subsided to normal size and shape. He has been an active wage earner during the year since, but recently some enlarged glands were palpated in the inguinal region. They do not seem to be metastases but a new manifestation of the lymphadenia to which he is subject. Two other patients are at work with no indication of recurrence. In a fourth case a woman of 74 was treated for a lymphosarcoma in the left tonsil. A needle with stout thread was passed through the anterior pillar and the platinum tube containing 48 mg. of radium was drawn by the thread into the depths of the tonsil, a hole being burrowed for each end of the tube in the abnormal tonsil tissue. A small tampon of gauze was placed over it and the tube was left in place for 19 hours. The dose applied was 912 milligram hours. Improvement was rapid, the tumor promptly subsiding, and in a month or two both tonsils had completely retrogressed. In another case the cancer in the tonsil was far advanced but the symptoms were notably improved by implanting the radium tube in a slit made with the bistoury in the tumefied tonsil. It was left in place for twenty-four hours and the condition was much relieved. The application was repeated later and swallowing became less difficult but the enlarged glands in the neck were not modified. The man is now taking a course of roentgen treatment for them, but his condition is precarious."

* * * * *

Esquerido: Results of Radium Application in Uterine Cancer. Therapia, Barcelona, 1917, ix, 681. Abstracted in Surg., Gynec., & Obst., May, 1918, p. 468.

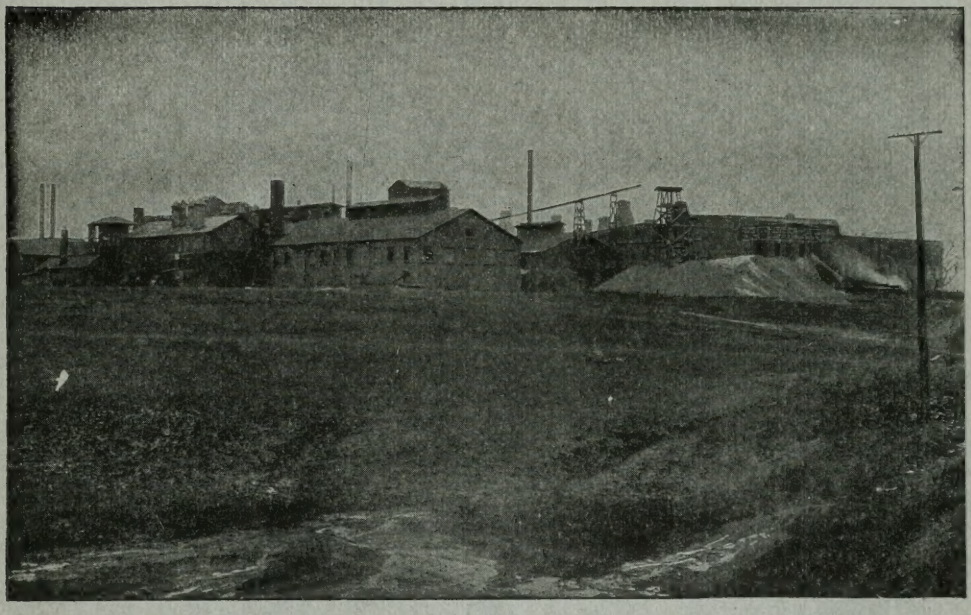
"The author has used radium in 12 cases of uterine cancer since February, 1916. In 3 cases of operable cancer, all recovered. In 7 operable cases there were 3 recoveries, 1 improvement. In 2 cases of inoperable epithelioma of the cervix and uterine corpus, the tendency is to grow worse."

"In 2 cases of recurrence after operation, the application of radium obtained a reduction of cicatricial fungi in one."

* * * * *

STANDARD CHEMICAL COMPANY

PITTSBURGH, PA.



Reduction Mill of Standard Chemical Co., Canonsburg, Pa.

Miners of Uranium and Vanadium Ores, and Producers of Radium

STANDARD CHEMICAL COMPANY

RADIUM
STANDARD CHEMICAL CO.

United States
Bureau of Standards
Measurement

APPLICATORS

Standard and
Special Designs

Inquiries Solicited

RADIUM CHEMICAL COMPANY

GENERAL OFFICES AND LABORATORIES

Pittsburgh, Pa.

New York
501 Fifth Avenue.

Boston
Little Building.

Chicago
Marshall Field Annex Building.

San Francisco
908 Butler Building.

London
Watson & Sons, (Electro-Medical) Ltd.
196 Great Portland Street, W. I.